S2 Reduced Data Set Report

Isabel R. Leonor
University of Oregon

S2 RDS Channels

S2 RDS = channel selection
+ downsampling (some channels)
+ gzip compression

- produced in real time using LDAS at LHO and LLO by Greg Mendell and Igor Yakushin
- AS_Q not resampled
- channels: LSC error and control, ETM_EXC, power in arms, WFS, OPLEV, PEM, STATE, ACTIVITY, and more

channel list is in http://darkwing.uoregon.edu/~ileonor/ligo/s2/rds/rdstable_s2.pdf
(there is also link in S2 web page)

Summary of S2 Reduced Data Set

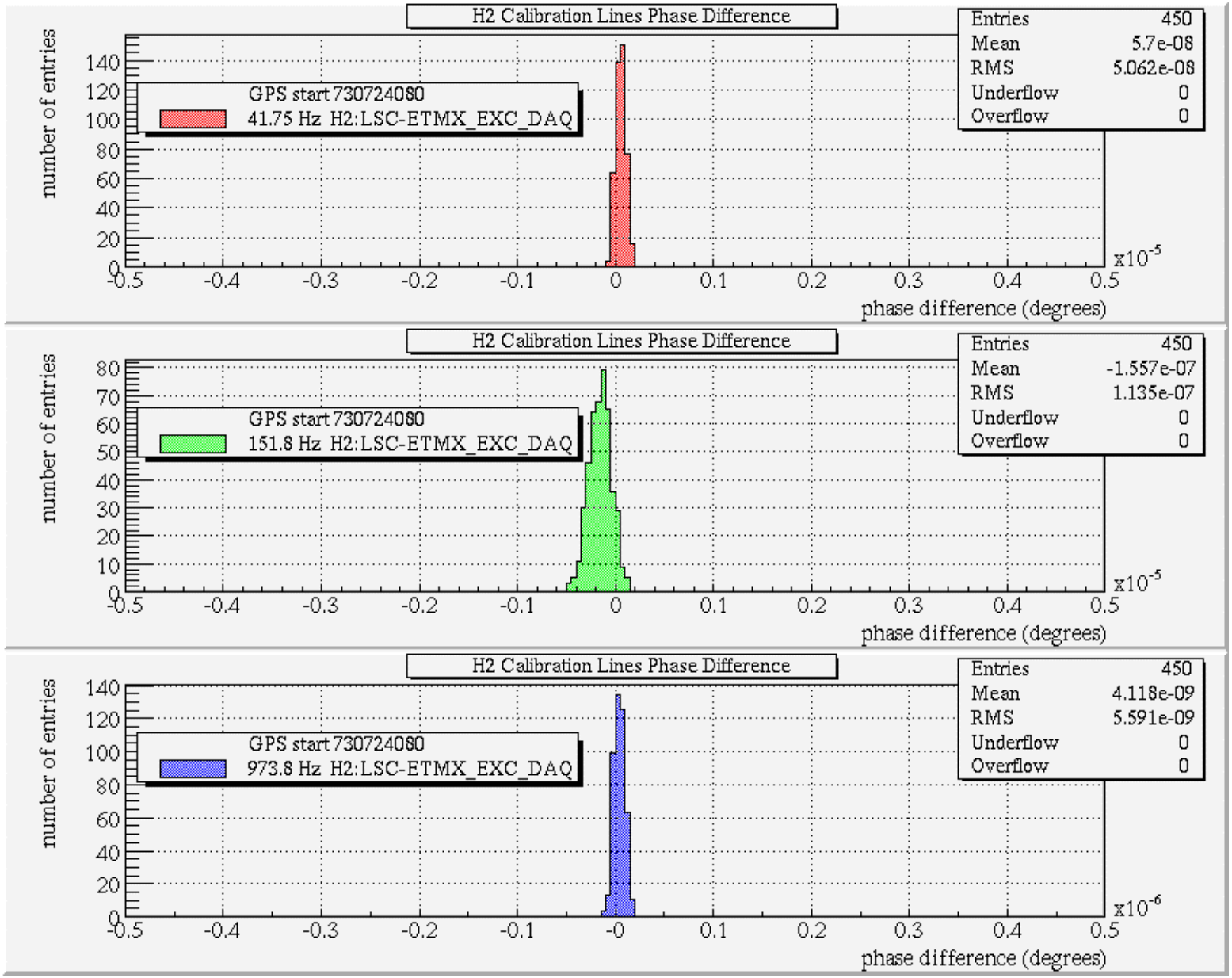
	Hanford	Livingston
number of channels	**200**	**107**
frame size	**~16.5 MB**	**~8.5 MB**
S2 volume (1416 hours)	**5.3 TB**	**2.7 TB**

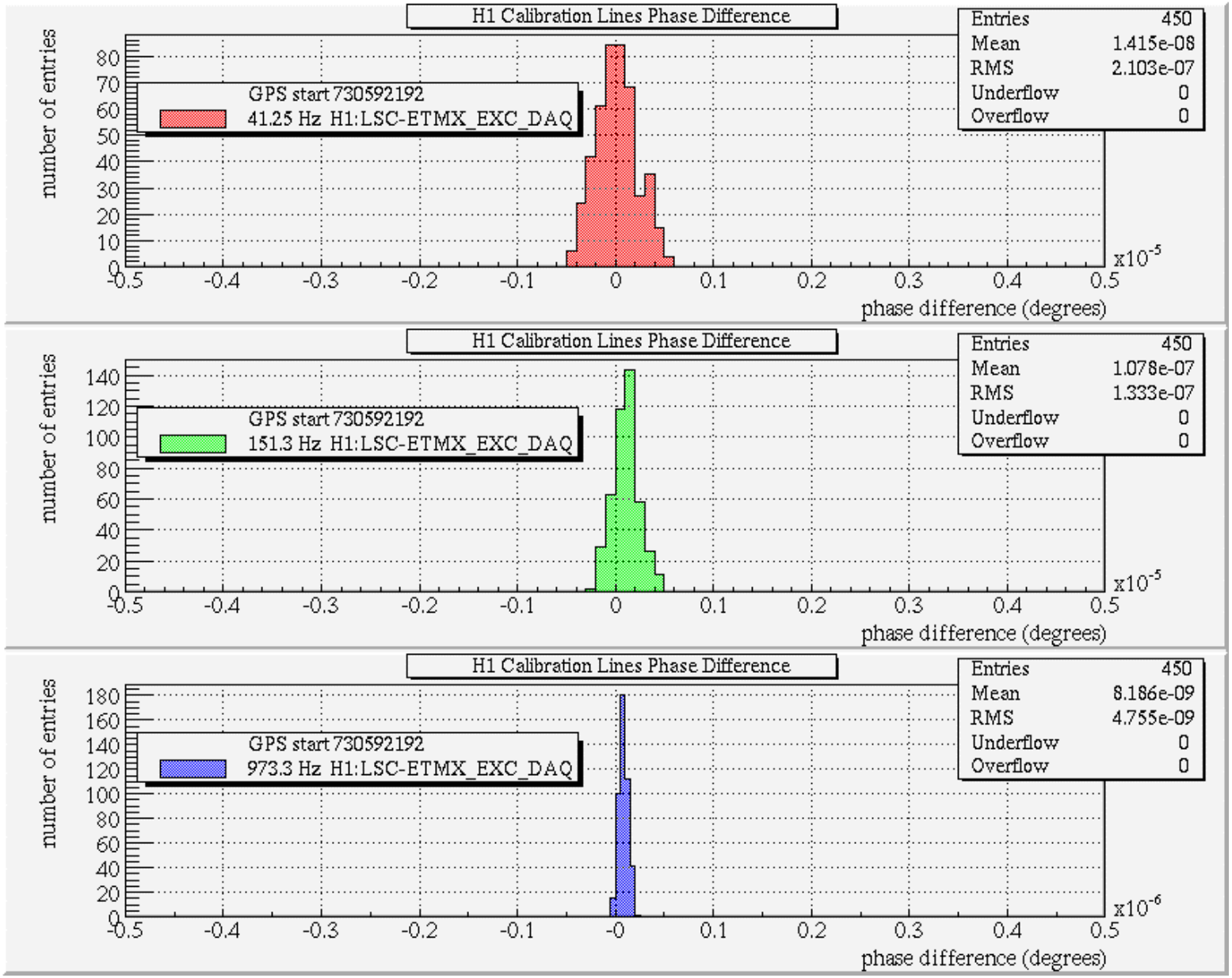
total S2 RDS volume : 8.0 TBytes

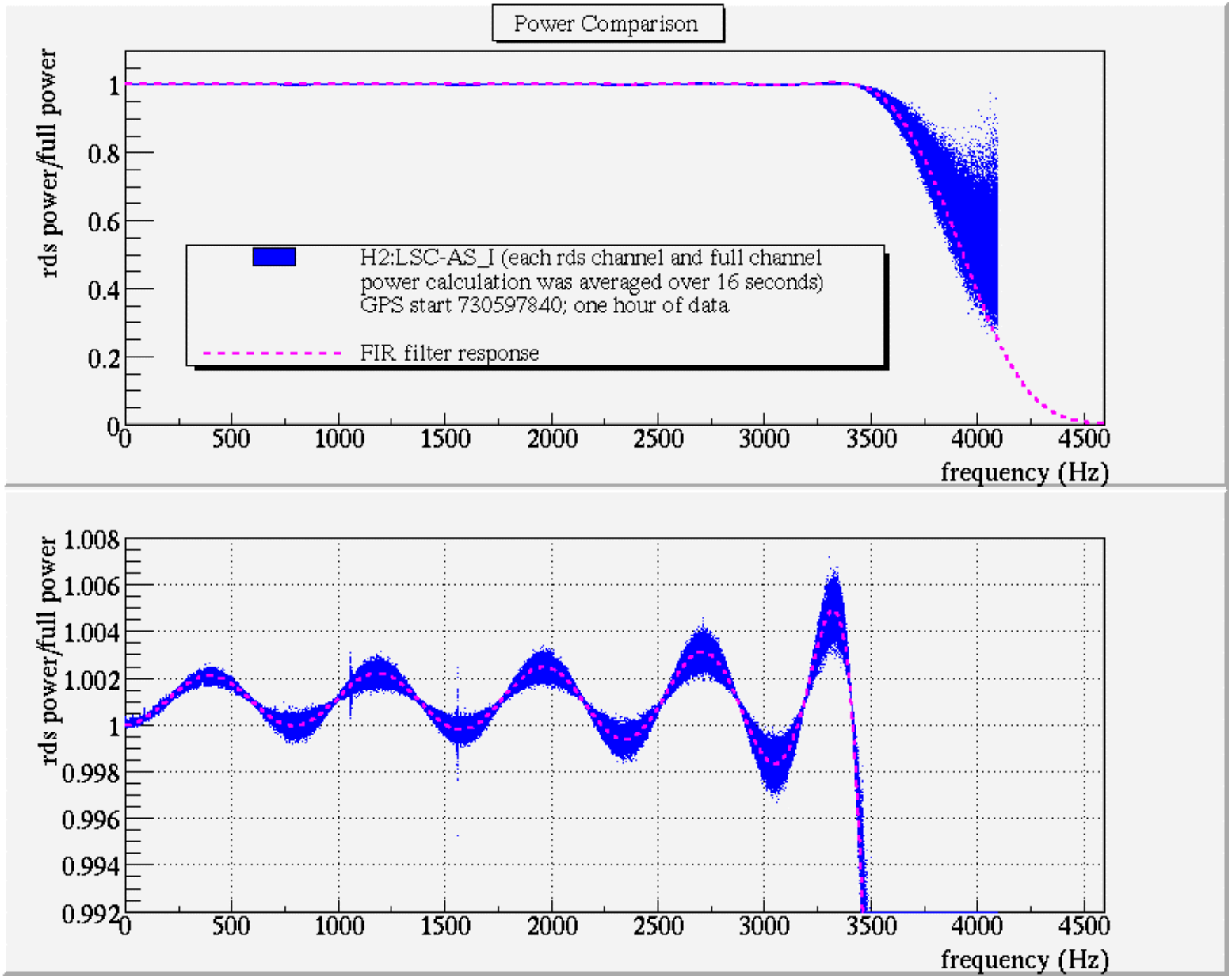
or 15.8% of full data volume (50.6 TBytes)

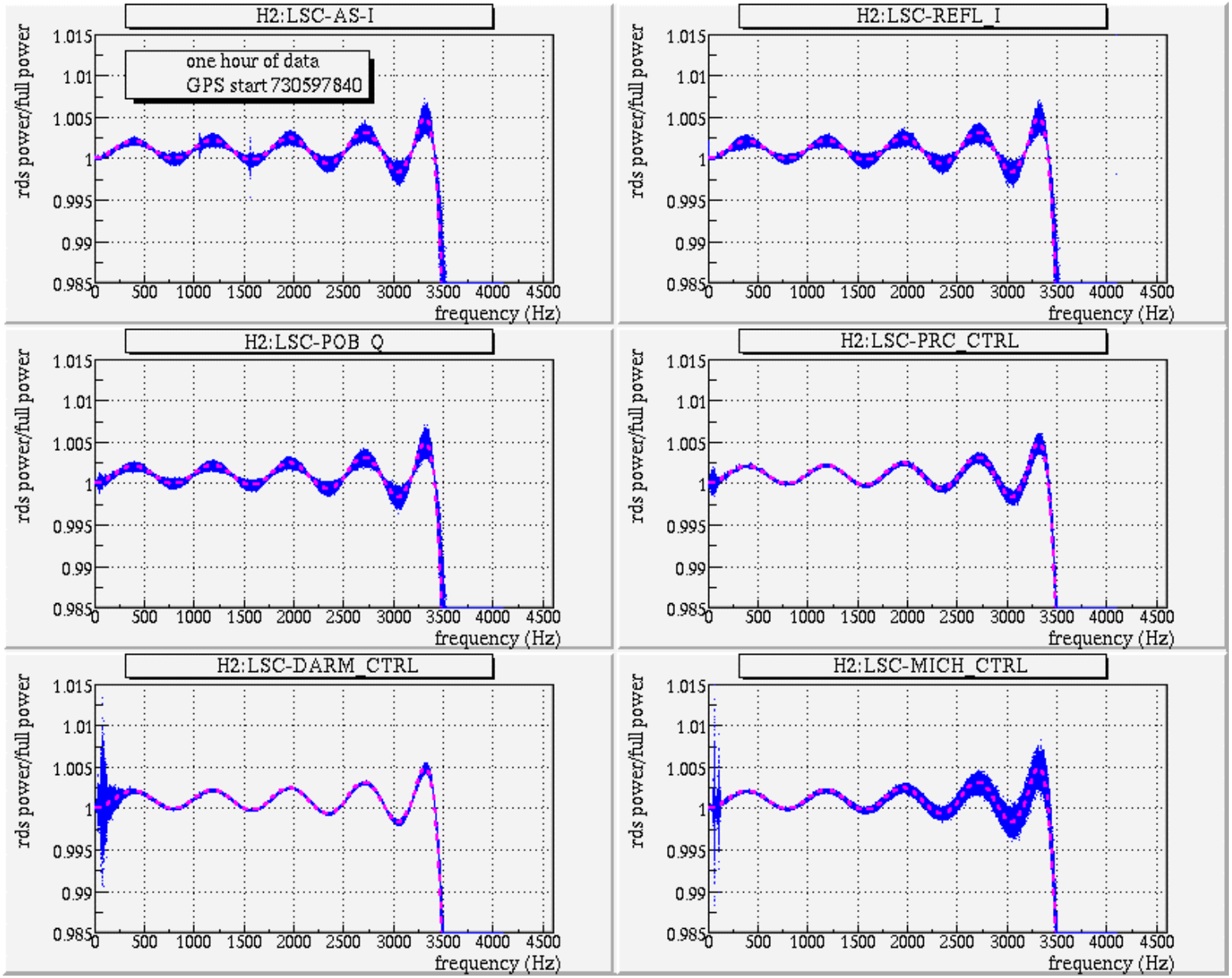
Access to S2 RDS

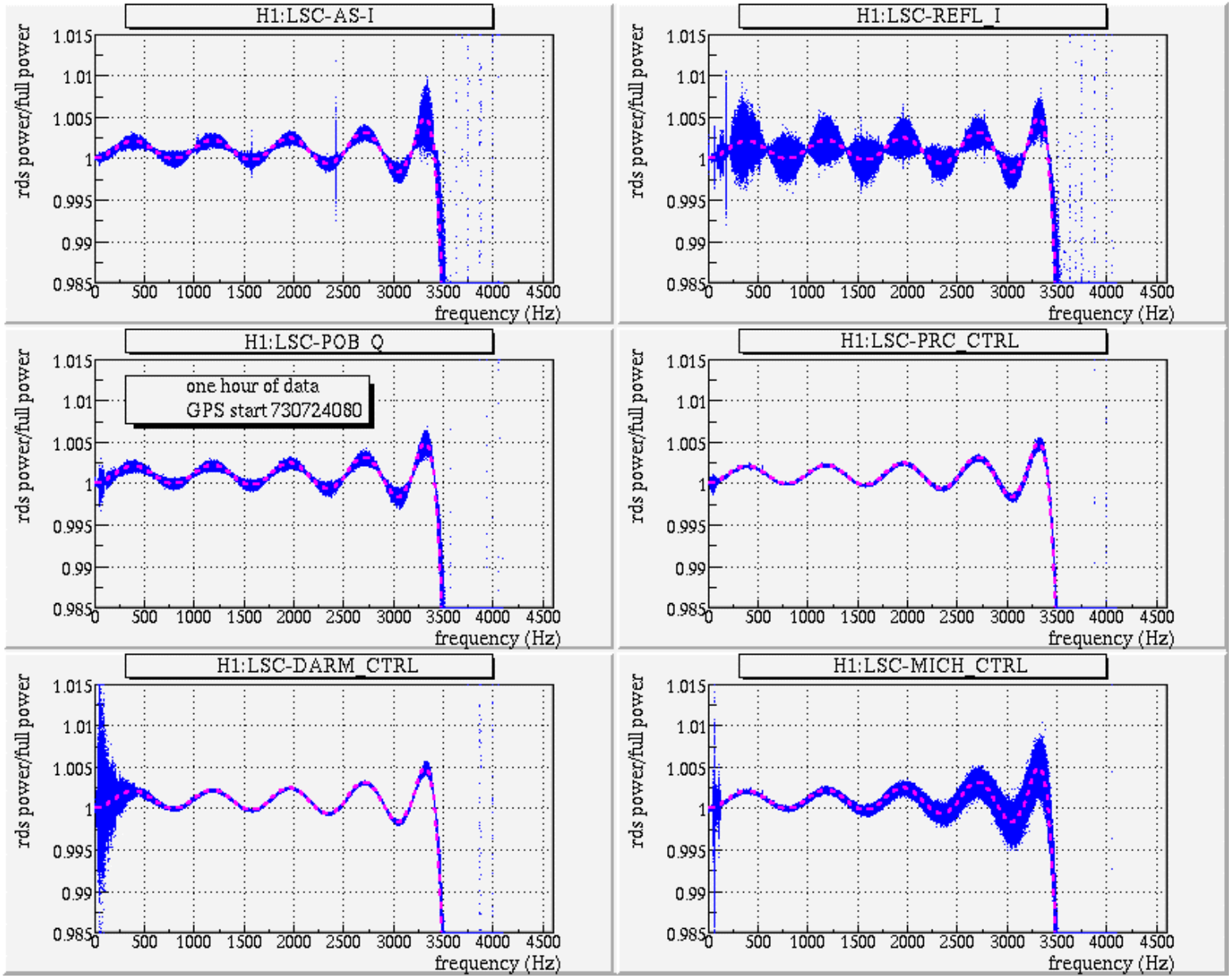
- from fortress at LHO and decatur at LLO
  - LHO : /frame20/rds/S2/LHO
    e.g., H-RDS_R_L1-730724080.gwf
  - LLO : /frame10/rds/S2/RDS107/L1
    e.g., L-RDS_R_L1-730724080.gwf
- available through LDAS
  - ~2x faster to access a channel (AS_Q) using RDS frames
  - use RDS_R_L1 as frame type in framequery command
- readable by VIRGO frame library
  - use FrAdcDataFind or FrProcDataFind for random channel access

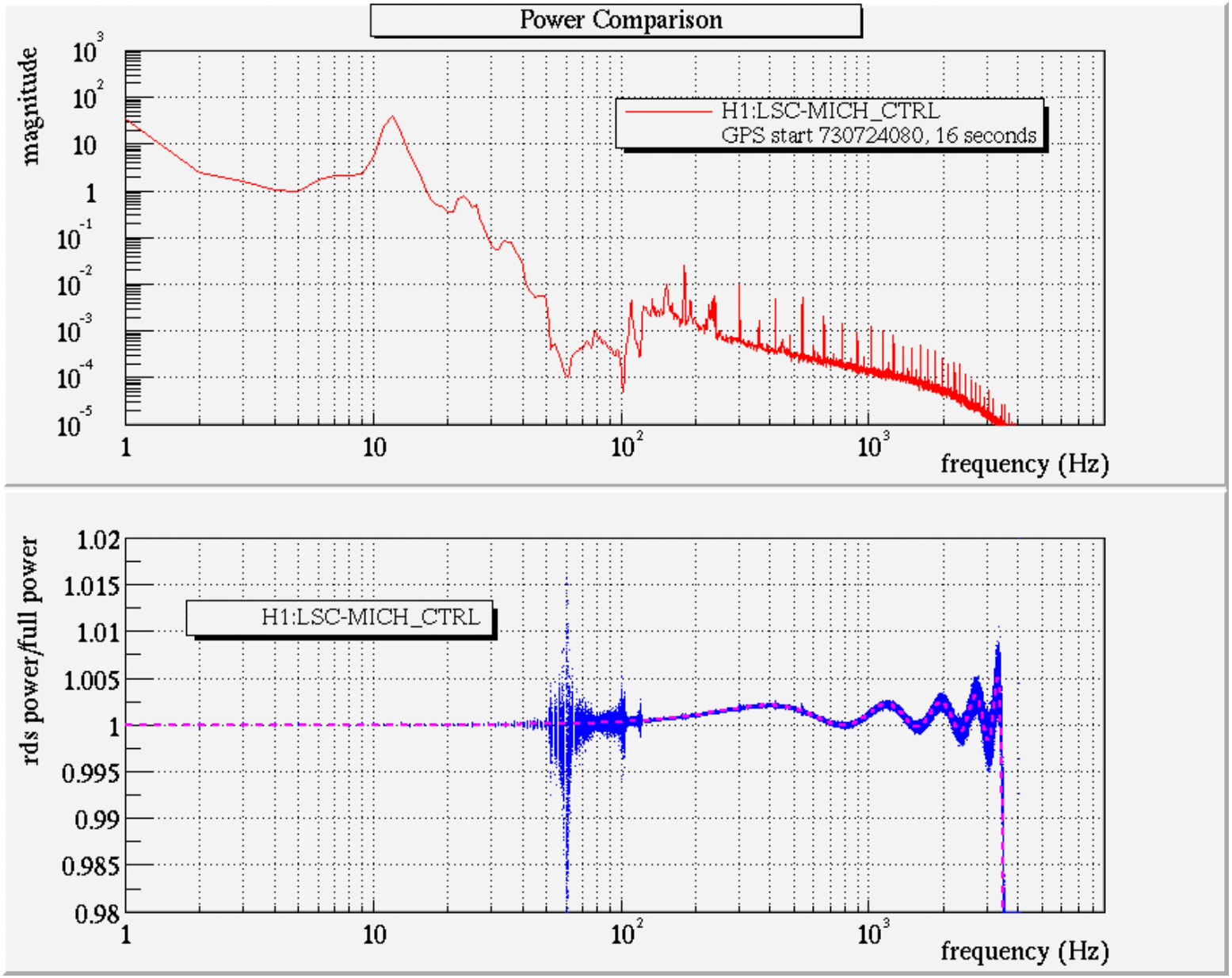

H2 Calibration Lines Phase Difference
GPS start 730724080
41.75 Hz H2:LSC-ETMX_EXC_DAQ
Entries 450
Mean 5.7e-08
RMS 5.062e-08
Underflow 0
Overflow 0
number of entries
phase difference (degrees)
x10^-5
H2 Calibration Lines Phase Difference
GPS start 730724080
151.8 Hz H2:LSC-ETMX_EXC_DAQ
Entries 450
Mean -1.557e-07
RMS 1.135e-07
Underflow 0
Overflow 0
number of entries
phase difference (degrees)
x10^-5
H2 Calibration Lines Phase Difference
GPS start 730724080
973.8 Hz H2:LSC-ETMX_EXC_DAQ
Entries 450
Mean 4.118e-09
RMS 5.591e-09
Underflow 0
Overflow 0
number of entries
phase difference (degrees)
x10^-6

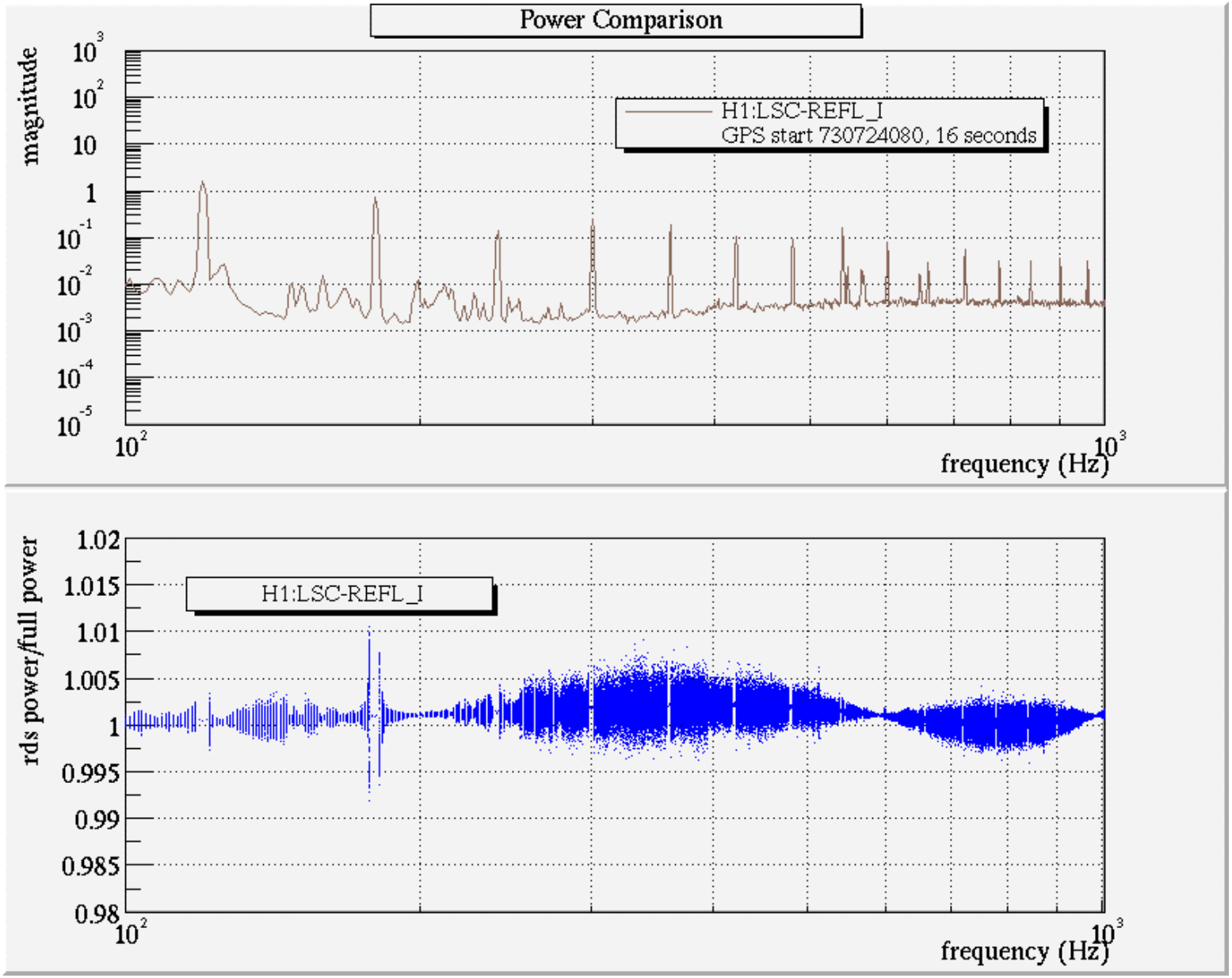

H1 Calibration Lines Phase Difference
GPS start 730592192
41.25 Hz H1:LSC-ETMX_EXC_DAQ
Entries 450
Mean 1.415e-08
RMS 2.103e-07
Underflow 0
Overflow 0
number of entries
phase difference (degrees)
x10^-5
H1 Calibration Lines Phase Difference
GPS start 730592192
151.3 Hz H1:LSC-ETMX_EXC_DAQ
Entries 450
Mean 1.078e-07
RMS 1.333e-07
Underflow 0
Overflow 0
number of entries
phase difference (degrees)
x10^-5
H1 Calibration Lines Phase Difference
GPS start 730592192
973.3 Hz H1:LSC-ETMX_EXC_DAQ
Entries 450
Mean 8.186e-09
RMS 4.755e-09
Underflow 0
Overflow 0
number of entries
phase difference (degrees)
x10^-6

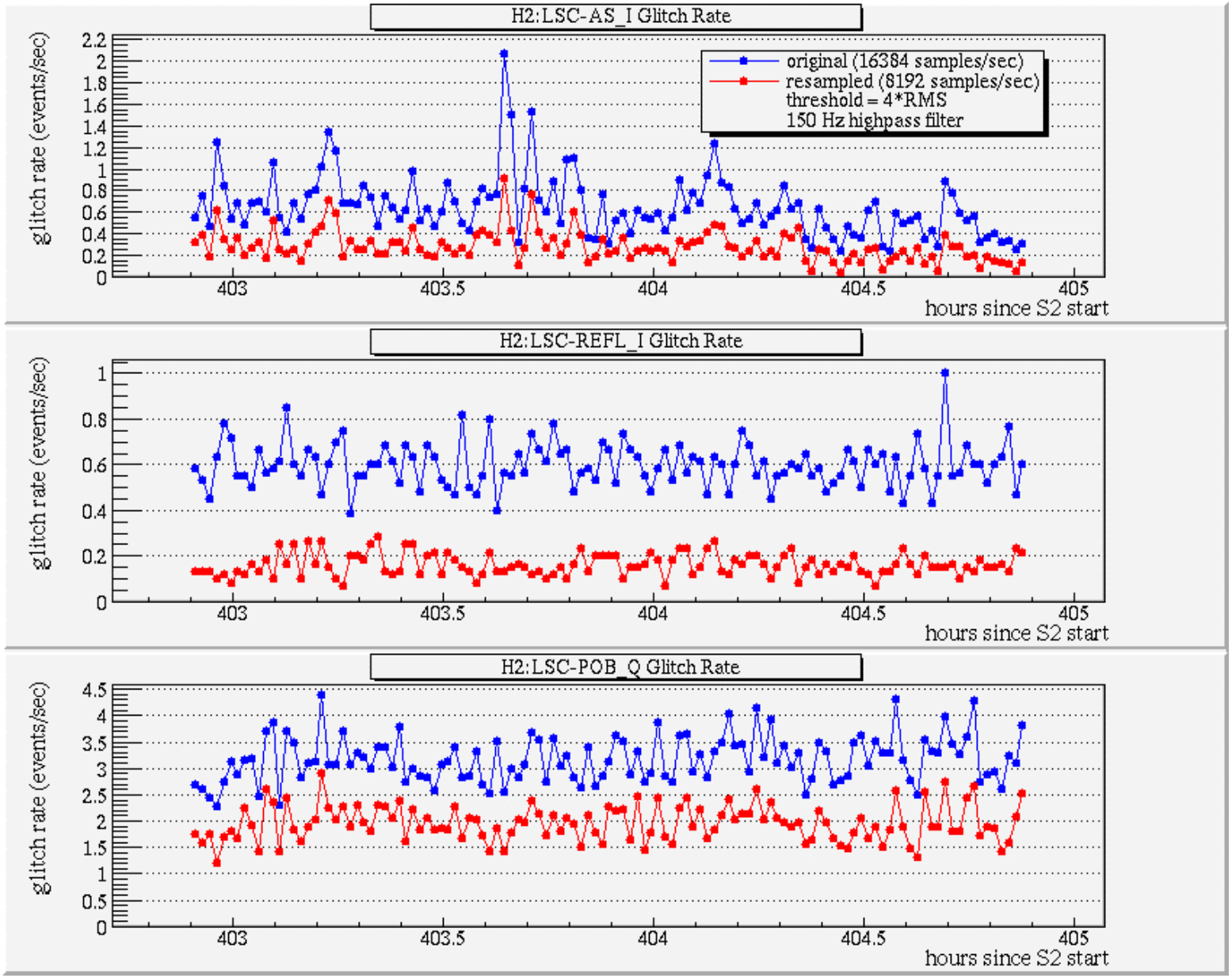

Power Comparison
rds power/full power
1
0.8
0.6
0.4
0.2
0
0
500
1000
1500
2000
2500
3000
3500
4000
4500
frequency (Hz)
H2:LSC-AS_I (each rds channel and full channel power calculation was averaged over 16 seconds) GPS start 730597840; one hour of data
FIR filter response
rds power/full power
1.008
1.006
1.004
1.002
1
0.998
0.996
0.994
0.992
0
500
1000
1500
2000
2500
3000
3500
4000
4500
frequency (Hz)

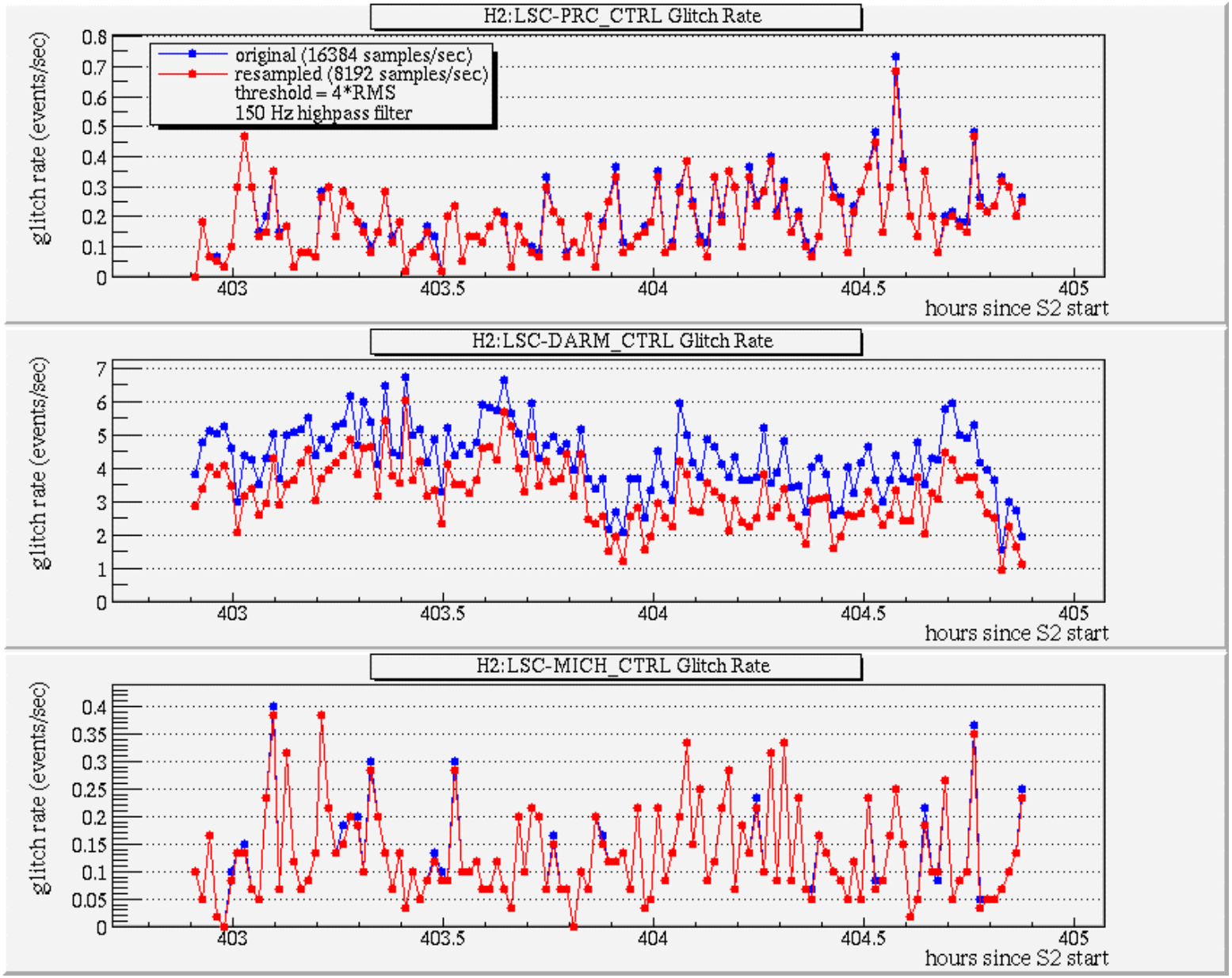

H2:LSC-AS-I
one hour of data
GPS start 730597840
H2:LSC-REFL_I
H2:LSC-POB_Q
H2:LSC-PRC_CTRL
H2:LSC-DARM_CTRL
H2:LSC-MICH_CTRL
rds power/full power
frequency (Hz)

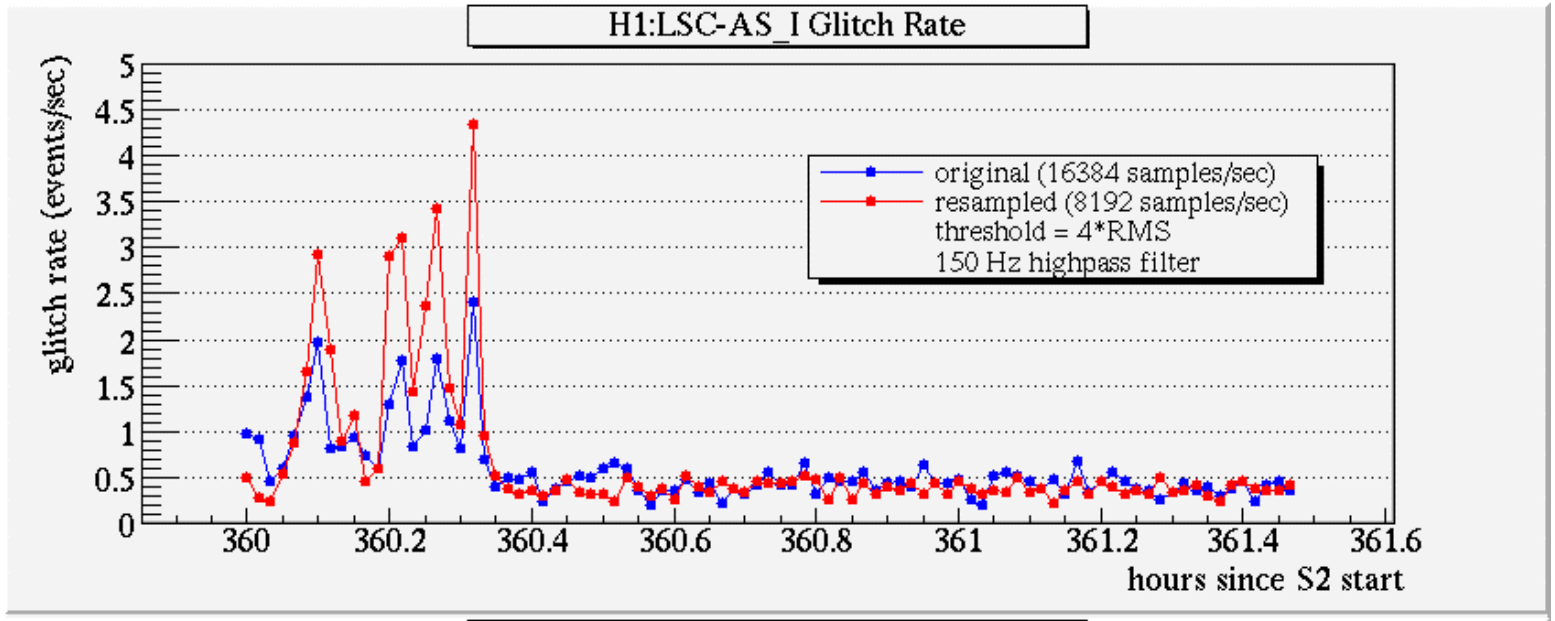

H1:LSC-AS-I
H1:LSC-REFL_I
H1:LSC-POB_Q
one hour of data
GPS start 730724080
H1:LSC-PRC_CTRL
H1:LSC-DARM_CTRL
H1:LSC-MICH_CTRL
rds power/full power
frequency (Hz)

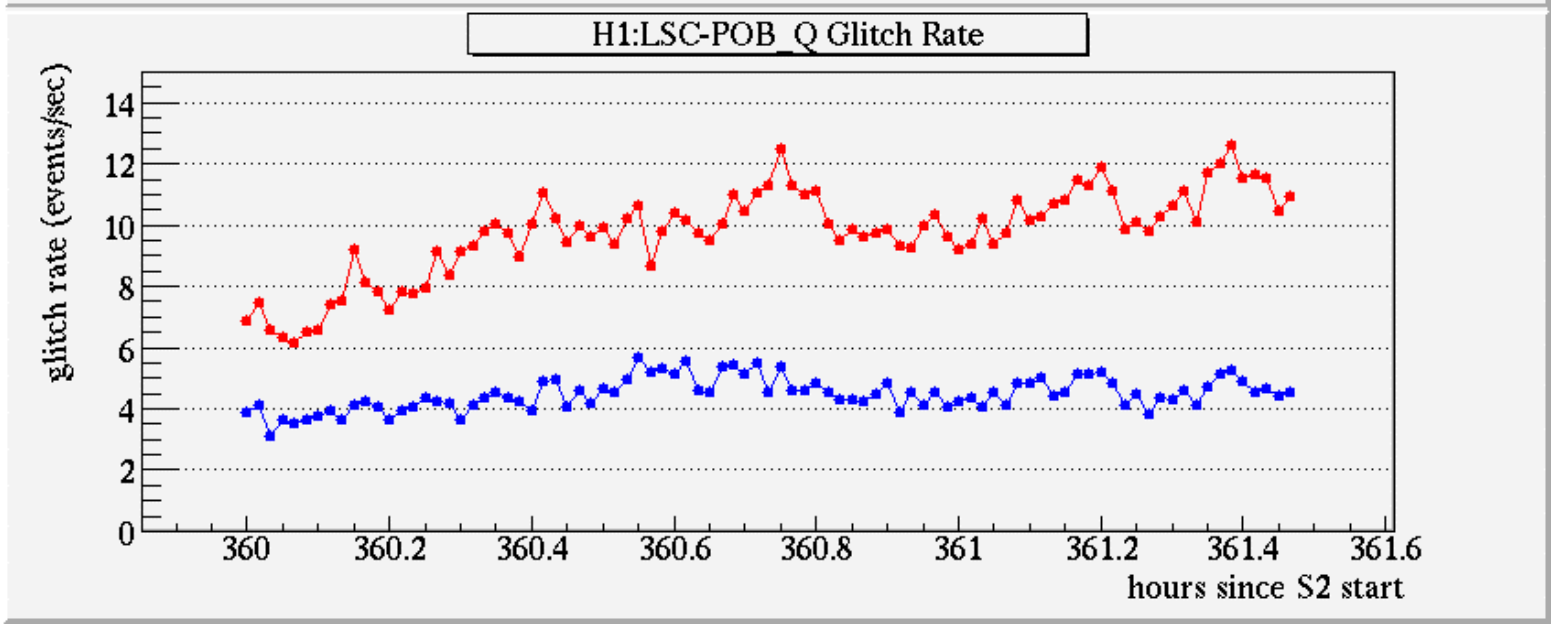

Power Comparison
magnitude
H1:LSC-MICH_CTRL
GPS start 730724080, 16 seconds
frequency (Hz)
rds power/full power
H1:LSC-MICH_CTRL
frequency (Hz)

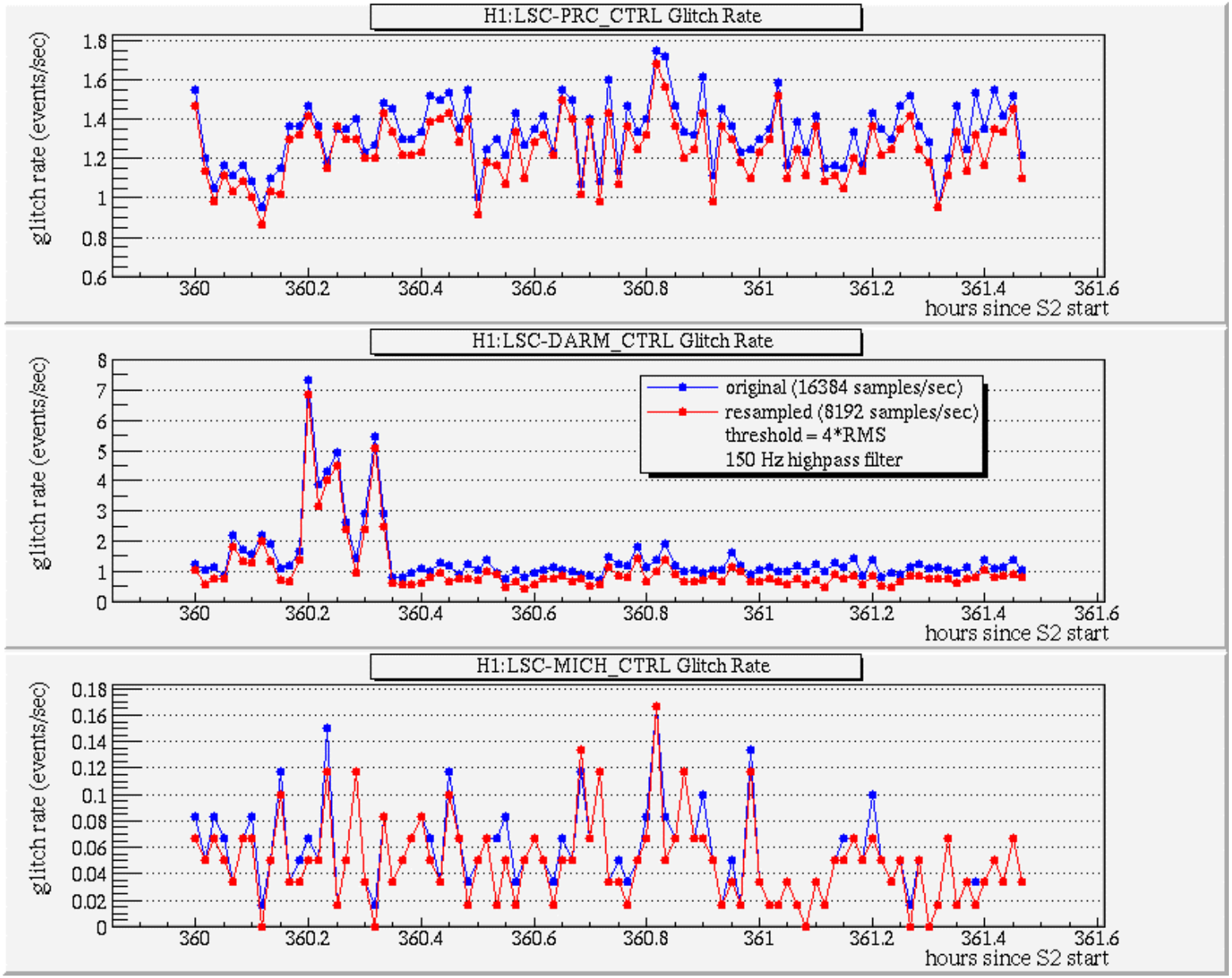

Power Comparison
magnitude
H1:LSC-REFL_I
GPS start 730724080, 16 seconds
frequency (Hz)
rds power/full power
H1:LSC-REFL_I
frequency (Hz)

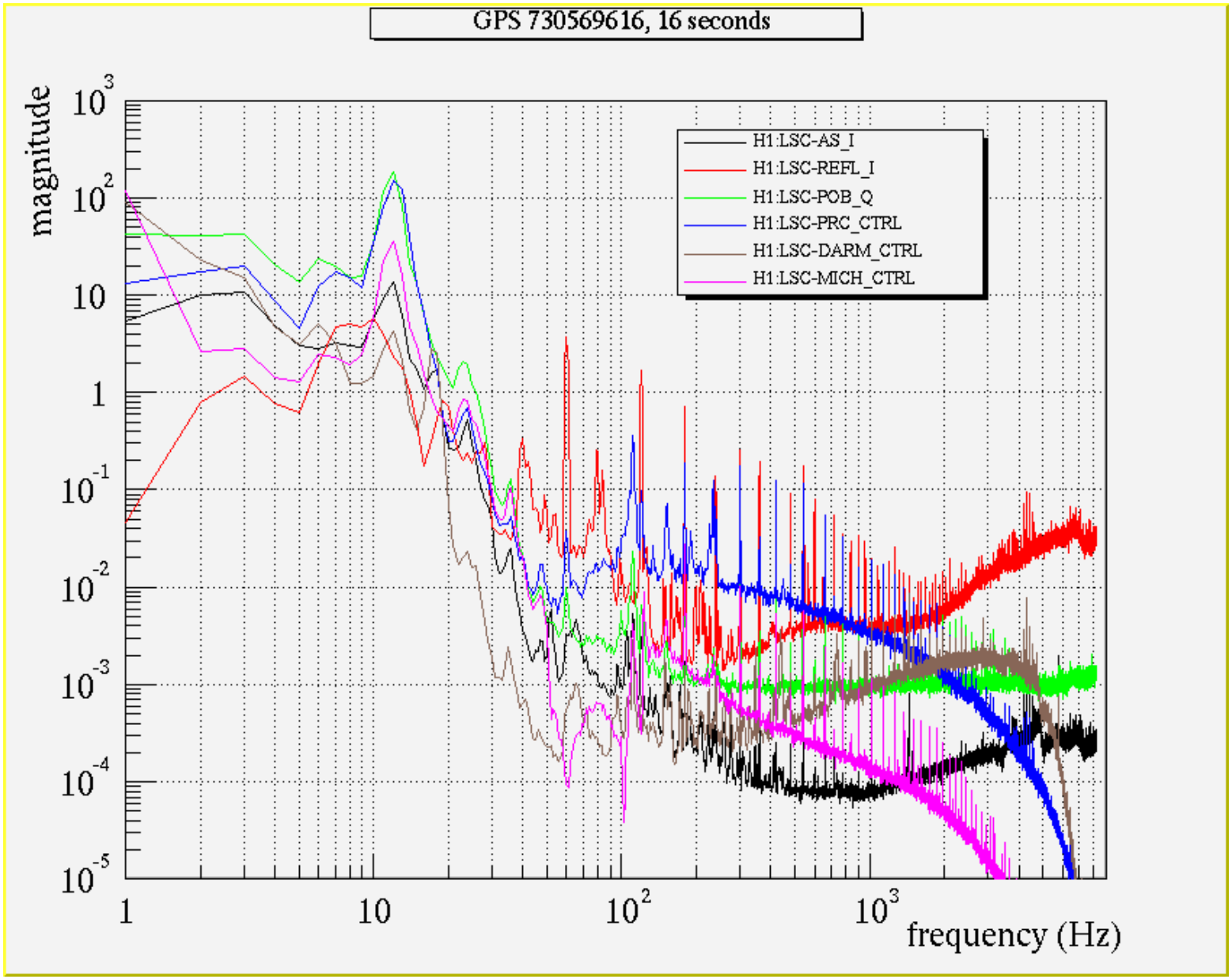

H2:LSC-AS_I Glitch Rate
glitch rate (events/sec)
original (16384 samples/sec)
resampled (8192 samples/sec)
threshold = 4*RMS
150 Hz highpass filter
hours since S2 start
H2:LSC-REFL_I Glitch Rate
glitch rate (events/sec)
hours since S2 start
H2:LSC-POB_Q Glitch Rate
glitch rate (events/sec)
hours since S2 start


H2:LSC-PRC_CTRL Glitch Rate
original (16384 samples/sec)
resampled (8192 samples/sec)
threshold = 4*RMS
150 Hz highpass filter
glitch rate (events/sec)
hours since S2 start
H2:LSC-DARM_CTRL Glitch Rate
glitch rate (events/sec)
hours since S2 start
H2:LSC-MICH_CTRL Glitch Rate
glitch rate (events/sec)
hours since S2 start


H1:LSC-AS_I Glitch Rate
glitch rate (events/sec)
original (16384 samples/sec)
resampled (8192 samples/sec)
threshold = 4*RMS
150 Hz highpass filter
hours since S2 start


H1:LSC-POB_Q Glitch Rate
glitch rate (events/sec)
hours since S2 start


H1:LSC-PRC_CTRL Glitch Rate
glitch rate (events/sec)
hours since S2 start
H1:LSC-DARM_CTRL Glitch Rate
original (16384 samples/sec)
resampled (8192 samples/sec)
threshold = 4*RMS
150 Hz highpass filter
H1:LSC-MICH_CTRL Glitch Rate


GPS 730569616, 16 seconds
magnitude
frequency (Hz)
H1:LSC-AS_I
H1:LSC-REFL_I
H1:LSC-POB_Q
H1:LSC-PRC_CTRL
H1:LSC-DARM_CTRL
H1:LSC-MICH_CTRL

Summary

- S2 RDS frames being generated in real time
- downsampling is sound
- S2 RDS data is available
  - LDAS
  - LHO (fortress): /frame20/rds/S2/LHO
  - LLO (decatur): /frame10/rds/S2/RDS107/L1